## Remarks

Claims 1-30 and 39-41 were pending in the subject application. By this Amendment, claims 40 and 41 have been amended. The undersigned avers that no new matter is introduced by this amendment. Entry and consideration of the amendments presented herein is respectfully requested. Accordingly, claims 1-30 and 39-41 are currently pending in the subject application. Favorable consideration of the pending claims is earnestly solicited.

Claim 40 was rejected under 35 U.S.C. § 112, second paragraph. Applicants appreciate the Examiner's careful reading of the claims. Claim 40 has been amended to correct the typographical error pointed out by the Examiner. Specifically, in claim 40, "during" has been amended to read "duration" which is consistent with the language of claim 39, from which claim 40 depends. No new matter is introduced by this amendment. Accordingly, applicants respectfully request reconsideration and withdrawal of the rejection to claim 40 under 35 U.S.C. § 112.

Claim 41 has been amended to correct a typographical error and add a period. No new matter is introduced by this amendment.

Claims 1, 3, 9, 10, 24-30, and 39-41 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Blyler, Jr *et al.* (U.S. Patent No. 6,265,018), either alone or further in view of Blyler, Jr. *et al.* (U.S. Patent No. 6,254,808). The applicants respectfully traverse this ground for rejection. A *prima facie* case of obviousness has not been presented. Three criteria must be met to establish *prima facie* case of obviousness. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Second, there must be a reasonable expectation of success. Finally, the prior art reference, or combination of references, must teach or suggest all the claim limitations. Applicants respectfully traverse the rejection as a prima facie case of obviousness has not been presented and since the prior art does not provide any suggestion or motivation to modify the Blyler, Jr. *et al.* ('018) reference, either alone, or further in view of the Blyler, Jr. *et al.*('808) reference, to arrive at the subject invention as claimed in claims 1, 3, 9, 10, 24-30, and 39-41 and there is no reasonable expectation of success of such a modification.

The Office Action states at page 2, that "[e]xtrusion machine 401 of Figure 4 of the primary reference is disclosed to be that shown in Figs. 1A and 1B of Blyler '808, which includes a heated diffusion section 22 through which the fiber passes continuously and the additive is diffused."

However, the Blyler ('808) reference at col. 3, lines 61-64, teaches "core and cladding polymers are fed into, respectively, a core extruder **12** and a cladding extruder **14** of a fiber extrusion apparatus **10**". There is no teaching in the Blyler '808 reference for adding a buffer material. The Blyer '018 reference teaches two embodiments, illustrated in Figure 1 and Figure 2 (see col. 3, line 22-23 and col.4, lines 12-13). In both embodiments, as taught at col. 3, lines 24-26 and col. 4, lines 16-18, the method of fabricating plastic optical fiber "adds the buffer material to the ...optical fiber". The Blyler '018 reference teaches, at col. 4, line 55 through col. 5, line 18, the apparatus for implementing both embodiments with the initial plastic optical fiber is fabricated by extrusion.

In particular, the Blyer '018 reference teaches "Apparatus **401** is utilized to extrude the optical fiber, to enclose the optical fiber in a buffer and to form onto reel **406**" (see col. 4, lines 57-59). There is no teaching or suggestion of adding the buffer material before the diffusion zone, nor is there any need or motivation to do so. When referring to the first embodiment, which adds the buffer material to a step index plastic optical fiber, Blyler '018 teaches at col. 5, lines 4-9 "the step index plastic optical fiber is fabricated by maintaining the temperature in diffusion zone **24** of Figure 1B of the above-incorporated U.S. Patent Application below the temperature that would cause diffusion to occur, or alternatively by removing diffusion zone **24** from the apparatus". Likewise, when referring to the second embodiment, which adds the buffer material to the optical fiber that is experiences partial diffusion during extrusion, Blyler teaches at col. 5, lines 11-16 "the initial plastic optical fiber is fabricated by maintaining the temperature in diffusion zone **24** of Fig. 1B of the above-incorporated U.S. Patent Application of a temperature that will result in only partial diffusion occurring." The Blyler '018 teaches at col. 2, line 58-62 "when the plastic optical fiber is initially drawn from the preform, or is initially formed by extrusion, the resulting core and outer cladding are covered with a buffer material that will remain substantially undistorted at the temperature required for a high rate of diffusion."

Accordingly, the applicants assert there is no teaching or suggestion in the Blyer '018 reference of a method involving heating said polymeric tube surrounded by the outer tubing to a temperature which is below the glass transition temperature of the outer tubing and above all of the glass transition temperatures of said at least two concentric cylinders of polymer material, wherein such heating causes diffusion of the diffusible additive in said at least one of said at least two concentric cylinders of polymeric material, wherein such diffusion of the diffusible additive modifies

the radial refractive index of said polymeric tube, wherein the method is continuous, wherein heating said polymeric tube surrounded by the outer tubing comprises continuously passing said polymeric tube surrounded by the outer tubing through a heated enclosure, as claimed in claim 1 of the subject invention.

The Office Action then states that "[i]t is also maintained that making the entire heating process as continuous would have been within the skill level of the art." However, the Blyler '018 reference teaches away from the subject invention as claimed in claim 1.

The applicants assert that there would be no suggestion or motivation, either in the ('018) alone, or in view of the ('808) reference, or in the knowledge generally available to one of ordinary skill in the art, to modify the teachings of the ('018) reference in this way. In particular, the plastic optical fiber of the Blyler, Jr. *et al.* ('018) reference is placed on a reel and then the reel is put in an oven to heat the fiber for diffusion of the additives (see column 4, lines 17-35). Moreover, the method involves "testing" the reeled fiber <u>during</u> the diffusion of the additives to monitor the transmission bandwidth via, for example, pulse dispersion test, differential mode delay test, or bit error rate test (see column 4, lines 50-54). This testing, or monitoring, of the transmission bandwidth would seem to require access to the end(s) of the fiber, which would not be available during a continuous production of fiber.

In contrast, claim 1 includes "wherein heating said polymeric tube surrounded by the outer tubing comprises continuously passing said polymeric tube surrounded by the outer tubing through a heated enclosure". Accordingly, claim 1 is directed to an embodiment the subject invention, as claimed in claims 1, 3, 9, 10, 24-30, and 39-41 that pertains to a continuous method of manufacturing a plastic optical transmission medium wherein heating said polymeric tube surrounded by the outer tubing comprises continuously passing said polymeric tube surrounded by the outer tubing through a heated enclosure. The continuous nature of the subject method results in, as shown in Figure 2A, the polymeric tube surrounded by the outer tubing continuously passing through the heated enclosure (or other heat source) for diffusion to occur (see page 19, lines 1-2). Claim 40 includes the limitation "wherein the duration of time is adequate to achieve a desired radial refractive index profile of said polymeric tube".

Again, the Blyler '018 reference teaches a batch process where the transmission bandwidth is measured to determine when to stop heating. The Blyler, Jr. *et al.* ('018) reference teaches "block

102 draws the perform to the proper diameter for a step index plastic optical fiber, adds the buffer material to the step index plastic optical fiber, and places the step index plastic optical fiber on a reel . . . in block 103, the reel of step index optical fiber is placed in an area at ambient temperature, the oven is then heated until the optical fiber reaches an equilibrium temperature which is slightly less than the temperature required to place the step index plastic optical fiber in the high rate of diffusion state that causes a graded index plastic optical fiber to be formed." The applicants submit that the method taught by the Blyler, Jr. *et al.* reference is a batch method rather than a continuous method. In particular, the graded index plastic optical fiber of the Blyler, Jr. *et al.* reference is placed on a reel and then the reel is put in an oven to heat the fiber for diffusion of the additives (see column 4, lines 7-35). Moreover, the method involves "testing" the reeled fiber during the diffusion of the additives to monitor the refractive index profile of the fiber (related to the diffusion) via, for example, pulse dispersion test, differential mode delay test, or bit error rate test (see column 4, lines 50-54). This testing, or monitoring, of the index of refraction profile would seem to require access to the end(s) of the fiber, which would not be available during a continuous production of fiber.

Specifically, the Blyler, Jr. *et al.* references do not teach a method of manufacturing a plastic optical transmission medium with a radially varying refractive index, comprising preparing a polymeric tube having at least two concentric cylinders of polymeric material . . . surrounding said polymeric tube with an outer tubing . . . heating said polymeric tube surrounded by the outer tubing to a temperature which is below the glass transition temperature of the outer tubing and above all of the glass transition temperatures of said at least two concentric cylinders of polymer material, wherein such heating causes diffusion of the diffusible additive in said at least one of said at least two concentric cylinders of polymeric material, wherein such diffusion of the diffusible additive modifies the radial refractive index of said polymeric tube, wherein the method is continuous, <u>wherein heating said polymeric tube surrounded by the outer tubing comprises continuously passing said polymeric tube surrounded by the outer tubing through a heated enclosure</u>, as claimed in claim 1 of the subject application.

The Office Action states that "[i]t is also maintained that making the entire heating process as continuous would have been within the skill level of the art." As noted above, in reference to the method taught by the Blyler, Jr. *et al.* ('018) reference, the Blyler, Jr. *et al.* ('018) reference teaches testing techniques that requires the ends of the fiber to be accessible. There is <u>no motivation</u> to

modify the Blyler, Jr. *et al.* ('018) reference to make the method taught by the Blyler, Jr. *et al.* ('018) reference continuous, wherein heating a polymeric tube surrounded by the outer tubing comprises continuously passing the polymeric tube surrounded by the outer tubing through a heated enclosure, as claimed in claim 1 of the subject application. In fact, the Blyler '018 reference teaches away from a continuous method.

In particular, the method of the Blyler, Jr. *et al.* ('018) reference specifically addresses the significant problem in the prior art of achieving proper fiber specifications for transmission bandwidth. Specifically, the Blyler, Jr. *et al.* ('018) reference, in referring to prior art states at col. 2, lines 25-33,

> "In all of the above fabrication methods, optical transmission bandwidth is determined by a post-manufacturing test step **after** the cladding and buffer have been added to the fabricated core of the optical fiber and all diffusion processes are completed. If the transmission bandwidth does not meet the required specifications, the optical fiber must be discarded. This represents a significant problem in the prior art method of fabricating plastic optical fiber."

To overcome this problem, the Blyler, Jr. *et al.* ('018) reference teaches, at col. 2, lines 36-47 that

> "A departure in the art is achieved by a method for fabricating graded index plastic optical fiber by diffusing a high molecular weight dopant within a step index plastic optical fiber after the step index plastic optical fiber has been drawn from a perform. The step index plastic optical fiber may be fabricated by extruding one material circumferentially around another material, e.g., by use of a concentric nozzle. The dopant is diffused after the drawing or extruding of the step index plastic optical fiber by heating the plastic optical fiber to a temperature that causes a high rate of diffusion state **while** measuring the transmission bandwidth of the plastic optical fiber" (underline added for emphasis).

In addition, the Blyler, Jr. *et al.* reference teaches, at col. 2, lines 65-67, "[a]fter the plastic optical fiber has been drawn, diffusion is completed while testing for the specified transmission bandwidth" (underline added for emphasis). In order to measure the transmission bandwidth of the

plastic optical fiber, Blyler, Jr. *et al.* reference teaches using test sets **304** and **404**. Specifically, at col. 4, lines 50-54, "[t]est set **304** may be a pulse dispersion test set . . . a differential mode delay test set or may be a test set that simply measures the bit error rate of a high-speed optical serial link." Therefore, this testing, or monitoring, of the transmission bandwidth of the plastic optical fiber would seem to require access to the end(s) of the fiber, which would not be available during a continuous production of fiber. Accordingly, there would be no motivation to remove the testing of the transmission bandwidth of the fiber during diffusion from the method of the Blyler '018 reference as the testing during diffusion appears to be the contribution Blyer Jr. *et al.* believe they contributed to the art.

Accordingly, the Blyler, Jr. *et al.* reference does not teach a method of manufacturing a plastic optical transmission medium with a radially varying refractive index . . . wherein the method is continuous, wherein heating said polymeric tube surrounded by the outer tubing comprises continuously passing said polymeric tube surrounded by the outer tubing through a heated enclosure, as claimed in claim 1 of the subject application. Moreover, the applicants assert that there is no motivation to modify the Blyler, Jr. *et al.* reference as stated in the Office Action and there is no reasonable expectation of success of such a modification. Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection of claims 1, 3, 9, 10, 24-30, and 39-41 under 35 U.S.C. §103(a).

Claims 2, 4-8, and 11-23 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Blyler, Jr. *et al.* in view of Koike *et al.*, either alone, or further in view of Blyler, Jr., *et al.* ('808), for the reasons of record as set forth in paragraph 2 of the previous action. The applicants respectfully traverse this grounds for rejection. The Office Action dated March 2, 2004 states, at paragraph 4, that

> "Blyler, Jr. *et al.* discloses the basic claimed process as set forth in paragraph 3, supra, the primary reference essentially lacking an explicit disclosure of using a non-polymerizing additive, the particular manner of diffusing the additive, refractive index relationships and polymeric materials for the concentric cylinders and additives used. Koike *et al.* –621 discloses making a graded index medium similar to that being made in the primary reference and teaches the use of a non-polymerizing additive, certain of the instant additives and polymeric materials for the concentric

cylinders and steps and refractive indices used for the polymers to arrive at the desired refractive index gradient. It is submitted that all of these aspects are quite well known in the art and would have been obvious expedients in the process of Blyler, Jr. *et al.* dependent on the exact optical (fiber) medium desired and use therefore."

In reference to claims 2, 4-8, and 11-23, the applicants respectfully traverse this grounds for rejection because the cited references alone, or in combination, do not disclose or suggest the unique and advantageous method or apparatus claimed by the current applicants. In particular, the limitations of the Blyler, Jr. *et al.* ('018) reference and the Blyler, Jr. *et al.* ('808) reference have been discussed above with respect to the rejection of claim 1 from which claims 2, 4-8, and 11-23 depend. The Koike *et al.* reference does not cure such defects. Therefore, a prima facie case of obviousness has not been presented. Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection of claims 2, 4-8, and 11-23 under 35 U.S.C. §103(a).

The applicants appreciate the Examiner providing comments, on page 3 of the Office Action, with respect to the applicants' prior arguments. The Office Action states that "while the primary reference does perform additional heating of the reeled composite, there clearly would be some amount of continuous heating provided by the diffusion zone 22 of Fig. 1A,B of Blyler -808, which Blyler -018 indicates is used as extruder 401 of Fig. 4 therein". However, as discussed above, the applicants' assert the Blyler '018 does not teach a method incorporating heating said polymeric tube surrounded by the outer tubing to a temperature which is below the glass transition temperature of the outer tubing and above all of the glass transition temperatures of said at least two concentric cylinders of polymer material, wherein such heating causes diffusion of the diffusible additive in said at least one of said at least two concentric cylinders of polymeric material, wherein such diffusion of the diffusible additive modifies the radial refractive index of said polymeric tube, wherein the method is continuous, wherein heating said polymeric tube surrounded by the outer tubing comprises continuously passing said polymeric tube surrounded by the outer tubing through a heated enclosure.

Rather, the Blyler '018 reference teaches away from heating in the diffusion zone 22 of Fig. 1A, B of Blyler '808 (see col. 5, lines 4-11 and discussion above regarding same) with respect to the first embodiment of the Blyler '018 method and teaches only partial diffusion occurring in the diffusion zone 22 of Fig. 1A, B of Blyler '808 (see col. 5, lines 11-18 and discussion above regarding

same) with respect to the second embodiment of the Blyler '018 method. Furthermore, there is no teaching or suggestion to add the buffer material prior to the diffusion zone **22** of Figure 1A, B of Blyler '808. At col. 4, line 55 through col. 5 line 18, the Blyler '018 reference teaches "Fig. 4 illustrates the apparatus necessary for implementing both embodiments when the initial plastic optical fiber is fabricated by extrusion. The Blyler '018 teaches at col. 2, line 58-62 "when the plastic optical fiber is initially drawn from the preform, or is initially formed by extrusion, the resulting core and outer cladding are covered with a buffer material that will remain substantially undistorted at the temperature required for a high rate of diffusion."

The applicants refer to claim 40, which depends from claim 39 and includes the limitation "wherein the duration of time is adequate to achieve a desired radial refractive index profile of said polymeric tube". With respect to the invention as claimed in claim 40, even if the Blyler '018 taught "some amount of continuous heating provided by the diffusion zone **22** of Fig. 1A, B of Blyler '808, which the applicants do not agree with, the Blyler '018 does not teach such continuous heating for a duration of time adequate to achieve a desired radical refractive index profile of said polymeric tube. In fact, the Office Action acknowledges "further heating in Blyler -018 would of course occur in oven 403, where the reeled composite tube is also heated to complete the diffusion". The Office Action further states "it would appear that Blyler -018 is using a rather complex process to ensure that the optical fiber has the desired gradient. However, one of ordinary skill in the art would have been able to readily determine the diffusion conditions (ie temperature and duration of heating) that would bring about the desired diffusion and simply convert the batch processing to a fully continuous one. The motivation for this is simple economics, a continuous process requiring less intervention and having short cycle time". However, as discussed above, the method of testing the transmission bandwidth during diffusion to determine when to stop diffusion appears to be what Blyler Jr. *et al.* believe they contributed to the art. Accordingly, there would be no motivation to remove the testing during diffusion from the Blyler '018 method.

In view of the foregoing remarks and the amendment above, the applicants believe that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§1.16 or 1.17 as required by this paper to Deposit Account 19-0065.

J:\NAN\105XC1\Amendment #3 doc/sjk

Applicants invite the Examiner to call the undersigned if clarification is needed on any aspect of this response, or if the Examiner believes there remains any valid ground upon which any claim in this application may be rejected subsequent to entrance of this amendment.

Respectfully submitted,

James S. Parker
Patent Attorney
Registration No. 40,119
Phone No.: 352-375-8100
Fax No.: 352-372-5800
Address: Saliwanchik, Lloyd & Saliwanchik
A Professional Association
P.O. Box 142950
Gainesville, FL 32614-2950

JSP/sjk
Attachments: